

**COLORADO RIVER RECOVERY PROGRAM  
FY-2001 PROPOSED SCOPE-OF-WORK for:  
Bonytail Reintroduction**

**Project No.: 25**

Lead Agency: Utah Division of Wildlife Resources  
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Date: April 21, 2000

Category:

- Ongoing project
- Ongoing-revised project
- Requested new project
- Unsolicited proposal

Expected Funding Source:

- Annual funds
- Capital funds
- Other (explain)

I. Title of Proposal:

Bonytail Reintroduction

## II. Relationship to RIPRAP:

General Recovery Program Support:

- IV. Manage genetic integrity and augment or restore populations
- IV.a.5. Develop and Implement basinwide bonytail restoration plan

## III. Study Background/Rationale and Hypotheses:

### Background

Bonytail (*Gila elegans*) is currently thought to be functionally extirpated from the Upper Colorado River Basin. The fish that remain in lower basin reservoirs probably do not reproduce (Tyus et al. 1982). All that remains of this species are hatchery reared progeny whose native habitat and basic ecology are virtually unknown. The recovery plan for this species hinges on reconstructing the basic ecological needs of the species and understanding how a reintroduction program may be implemented given the current conditions in the upper basin. While a general consensus has been reached that the changes in flows and temperature regimes resulting from Flaming Gorge Dam have caused a demise in utilizable habitat (Holden and Crist 1979), other potentially limiting factors have not been tested. These factors include food limitations, competitive interactions with introduced species, and size-specific vulnerability to exotic predators. One potential problem with previous study attempts may be due to the practice of using hatchery fish that have been reared in lentic water facilities. The physiological effects of this kind of approach are well documented in the literature as potentially problematic.

Previous flow-training research (see below) suggests that the physiological distinctiveness of young bonytail raised in flowing environments as opposed to those raised in static ponds is considerable. Differences in both swimming abilities and feeding behaviors have been observed in laboratory settings for fish that have been flow-trained versus those that have not.

### Flow-Training Results to Date

Prior flow-training research on bonytails has resulted in the following conclusions:

1. Bonytail show significant physiological responses to flow-training administered in their first year. Anaerobic muscle capabilities are increased, which is thought to be an adaptation to high flows.
2. As a result of physiological changes associated with flow-training, bonytails that have exhibited flow-training show strong preferences for higher velocity, more turbulent areas. Those fish not receiving training exhibit more random movements and habitat selection.

3. Red shiners and bonytail show similar habitat selection and feeding behaviors. When red shiners are present, bonytail shift away from the preferred habitats and/or low flows and show a decrease in feeding efficiency.

#### Present Flow-Training Work

The final component of the flow-training study was started at Utah State University in the fall of 1996 with 6 inch bonytail. The laboratory component of the study was completed in 1997, and the final results will be incorporated into a four chapter report by Todd Crowl. This work will help evaluate the working hypothesis:

- bonytail sizes targeted for stocking can be effectively trained; they do not need to be trained early in their life.

The bonytail were subjected to one of three treatments: 1) no flow; 2) 12 hrs of flow and 12 hrs of no flow; or, 3) constant flow. Two replicates were used for each treatment: small and large fish.

Preliminary results indicate that the bonytail under the constant flow and the no-flow treatments maintained steady growth.

#### Reintroduction

UDWR completed the Bonytail Reintroduction Plan for the Upper Colorado River Basin in March of 1996 (Lentsch et al. 1996). This Reintroduction Plan laid the groundwork for early (1996-1999) reintroduction efforts. The State of Utah Stocking Plan (SUSP) (Hudson et al. 1999) identifies a preferred methodology of reaching the interim population objective as identified in the Interim Management Objectives document (Lentsch et al. 1998). This scope of work (beginning in FY-2000) relies heavily on the SUSP as a guiding document. In this proposal, we seek funding to continue to raise, reintroduce and monitor bonytail stocked into the upper basin. The effectiveness of flow-training for reintroduced individuals may be tested in future reintroduction efforts, depending on the results of the flow-training study being conducted at USU. Our working hypotheses for bonytail reintroduction are:

- b) bonytail can be successfully reintroduced into the Upper Basin,
- c) the size of bonytail will affect their survival in the river,
- d) bonytail will move downstream following stocking, and
- e) habitat utilization overlap during spring runoff will be minimal between bonytail and roundtail chub.

IV. Study Goals, Objectives, End Product:

Goal:

The overall goal of this study is to reestablish bonytail in the Upper Colorado River Basin.

Objectives:

1. Reintroduce bonytail: raise bonytail to a target size in captivity and then stock in the Colorado River, Professor Valley and in the Green River, near the town of Green River, UT.
2. Determine the appropriate number and size of bonytail to stock to maximize survival. This objective will be completed by monitoring the stocked fish.
3. Determine movement and the potential for habitat utilization overlap between bonytail and roundtail. Investigate whether *Gila* species utilize similar micro- and meso-habitats.
4. Determine the importance of flow to bonytail survival. This objective will help determine if flow training results in enhanced survivorship of different sizes of bonytail. This objective may be field tested in FY-2001, depending on the final recommendations from the original flow-training study.

V. Study area (river miles, if appropriate):

Colorado River, Professor Valley - RM 100-60. Green River, near the town of Green River, UT - RM 132-100.

VI. Study Methods/Approach:

FY-2001

Objective 1, 2001:

As of Spring, 2000, approximately 75,000 1999-cohort bonytail are being held at the Wahweap hatchery. This lot of 1999 bonytail will be divided. A total of 48,000 will be stocked in the Colorado River and the Green River in Spring, 2000. In addition, 8,000 from the 1998 cohort will be stocked at each site, for a total of 32,000 bonytail per site. The remainder of the 1999 cohort will be held at Wahweap for a second growing season, and will be stocked at the two sites in Fall, 2000. Refer to Table 1 for a summary of past and future stocking efforts.

Approximately 200,000 bonytail sac-fry will be transported by air from Dexter to Wahweap Hatchery in early May 2000. These fish will be placed into 0.4 acre ponds and grown through the summer. After one growing season at Wahweap, 32,000 bonytail will be stocked at the Colorado River site, and 32,000 will be stocked at the Green River site. The remaining 2000 cohort will be held a second year in the Wahweap ponds and stocked during Spring 2002. All of these fish will be coded wire tagged prior to release.

Objective 2, 2001:

Approximately 23,000 bonytail were stocked near Dewey Bridge on the Colorado at RM 94.3 and 23,000 in the Green River near the town of Green River, Utah (RM 120), during the Fall 1998 (n=6,000), Spring 1999 (n=20,000), and Spring 2000 (n=32,000) (Table 1). These fish will be followed/monitored through the remainder of FY-2000 and into FY-2001. Monitoring will be conducted in the spring, summer and early fall. A variety of sampling gears will be employed; electrofishing and seining will be the primary techniques. Results of these efforts will help determine survivorship of stocked fish, will be used to evaluate stocking success, and will contribute to determination of appropriate stocking numbers and densities.

Table 1. Summary of stocking to date and projected reintroduction efforts. Figures in table indicate number of bonytail with specific cohort in parentheses.

		1998		1999		2000		2001		2002		2003		
Stock Site	1996	1997	Fall '97	Spr '98	Fall '98	Spr '99	Fall '99	Spr '00	Fall '00	Spr '01	Fall '01	Spr '02	Fall '02	Spr '03
Colo RM 94.3	1996 ( '96)	2165 ( '97) 10 ( '96)		114 ( '96) 2812 ( '97)	2232 (97) 1048 ( '98)	15 ( '96) 10,000 ( '98)		8,000 ( '98) 24,000 ( '99)	10,000 ( '99) 22,000 ( '00)			12,000 ( '01)	12,000 ( '02)	
Gr. RM 120.0					3000 ( '97)	10,000 ( '98)		8,000 ( '98) 24,000 ( '99)	10,000 ( '99) 22,000 ( '00)			12,000 ( '01)	12,000 ( '02)	
Green Riv., Island Pk												10,000 ( '00) 22,000 ( '01)	10,000 ( '01) 22,000 ( '02)	
Sac fry needed from Dexter*				40,000 1998 cohort		100,000 of the 1999 cohort		80,000 of the 2000 cohort		200,000 of the 2001 cohort		200,000 of the 2002 cohort		

\* factoring a 70% survival rate

VII. Task Description and Schedule:

FY-2001

Objective 1:

Transfer 100,000 bonytail sac fry from Dexter National Fish hatchery to the UDWR Wahweap facility in May 2000. Raise these fish in 0.4 acre ponds for eventual release at two locations in the Fall 2000 and at a third location in the Spring of 2002 (refer to Table 1)

Objective 2:

Monitor bonytail stocked in 1996 - fall 2000

FY-2002

Objective 1:

Transfer 100,000 bonytail sac fry from Dexter National Fish hatchery to the UDWR Wahweap facility in May 2001. Raise these fish in 0.4 acre ponds for eventual release at three Spring of 2002 (refer to Table 1).

VIII. FY-2001 Work (still stocking at the original two sites)

Deliverables/Due Dates:

RIP Annual Report due December, 2001.

Budget (assumes that the RIP will continue bonytail stocking efforts)

Objective 1 - covered under Wahweap O&M

Objective 2

Labor	\$45,000 (includes final report preparation)
Travel	\$ 5,000
Equipment	\$ 3,000
Other	<u>\$ 4,000</u>
Total	\$57,000

FY-2002 Work (incorporate third stocking site)

Deliverables/Due Dates:

RIP Annual Report due December, 2002.

Budget

Objective 1 - covered under Wahweap O&M

IX. Budget Summary

FY-2001 \$ 57,000

- FY-2002 - incorporation of the third stocking site in Utah (Island Park) will be covered through the Program's augmentation efforts.
- evaluation of the first two years of stocking at SUSP levels will be covered through the Program's long-term monitoring efforts.

X. References

Holden, P.B. and L.W. Crist. 1979. Documentation of changes in the macroinvertebrate and fish populations in the Green River due to inlet modification of Flaming Gorge dam. Annual Report - 1978. Bio/West Inc., Logan, UT.

Hudson, J.M., K.W. Wilson, L.D. Lentsch, and K.D. Christopherson. 1999. State of Utah Stocking Plan for Endangered Fish Species of the Upper Colorado River Basin, Draft Final Plan, Utah Division of Wildlife Resources, Salt Lake City, Utah, 52pp.

Lentsch, L. D., Y. Converse, P. D. Thompson, T. A. Crowl, and C. A. Toline. 1996. Bonytail reintroduction plan for the Upper Colorado River Basin. Publication Number 96-8. Utah Division of Wildlife Resources, Salt Lake City, Utah.

Lentsch, L.D., C.A. Toline, T.A. Crowl, and Y. Converse. 1998. Endangered fish interim management objectives for the Upper Colorado River Basin Recovery and Implementation Program. Final Report. Prepared for the Upper Colorado River Basin Recovery and Implementation Program, Project #55. Utah Division of Wildlife Resources, Salt Lake City, Utah.

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